

WHAT IS CLAIMED IS:

1. An electronic device, comprising:

an internal circuit having a first operation  
5 mode consuming a first operational current and a  
second operation mode consuming a second operational  
current, which is smaller than said first operational  
current;

a first power supply regulator for outputting a  
10 predefined output power supply voltage from an input  
power supply voltage and having a current supply  
ability corresponding to said first operational  
current of said internal circuit and a second  
regulator having a current supply ability  
15 corresponding to said second operational current; and

a power supply control unit for operating said  
first power supply regulator in response to a first  
control signal instructing said first operation mode  
in said internal circuit and operating said second  
20 power supply regulator in response to a second control  
signal instructing said second operation mode,

wherein said internal circuit and power supply  
control unit are provided in one semiconductor  
integrated circuit device.

25 2. An electronic device according to claim 1,

comprising:

wherein said first power supply regulator is a switching regulator having a pulse output circuit formed in said semiconductor integrated circuit device and a smoothing circuit having an inductance and a condenser provided in the outside of said semiconductor integrated circuit device; and

said second power supply regulator is a first series regulator formed in said semiconductor integrated circuit device.

3. An electronic device according to claim 2, wherein said internal circuit comprising a signal processing unit and a memory unit whose power supply voltage line is isolated by a switch; and

said second operation mode in said internal circuit includes an operation for turning said switch ON in order to supply current from said first series regulator to said signal processing unit and memory unit and an operation for turning said switch OFF in order to supply current only to said memory unit.

4. An electronic device according to claim 2, further comprising:

said internal circuit having a signal processing unit and memory unit whose power supply voltage line is isolated by a switch; and

a second series regulator for generating said predefined output power supply voltage from said input power supply voltage,

5 wherein said second operation mode of said internal circuit includes an operation for turning said switch ON in order to supply current from said first series regulator to said signal processing unit and memory unit and an operation that said first series regulator stops its operation and said second  
10 series regulator performs an operation in order to supply current only to said memory unit when said switch is turned OFF.

5. An electronic device according to claim 2, further comprising a second series regulator for  
15 generating a predefined output power supply voltage from said input power supply voltage and an analog circuit to which an operational voltage is supplied by said series regulator,

20 wherein said operation of said second series regulator can be stopped at the same time when operations by said switching regulator and series regulators are stopped.

6. An electronic device according to claim 2, further comprising a third series regulator for  
25 receiving said input power supply voltage or said

predefined output voltage in order to output a low voltage not more than said predefined output voltage and a partial circuit to which an operational voltage is supplied by said third series regulator;

5            wherein said operation of said third series regulator can be stopped at the same time when operations by said switching regulator and series regulators are stopped.

7. An electronic device according to claim 2,  
10       wherein said first power supply regulator is a first switching regulator having a pulse output circuit for outputting a pulse formed in a large output transistor corresponding in size to said first operational current formed in said semiconductor integrated  
15       circuit device and a smoothing circuit having an inductance and a condenser provided in the outside of said semiconductor integrated circuit device; and

             said second power supply regulator is a second switching regulator having a pulse output circuit for  
20       outputting a pulse formed in a small output transistor corresponding in size to said second operational current formed in said semiconductor integrated circuit device and said smoothing circuit.

8. An electronic device according to claim 1,  
25       wherein said internal circuit comprises a data

processing circuit having a microcomputer function for performing signal processing through a built-in program; and

5       said first operation mode and second operation mode are switched and said first and second control signals are generated in accordance with said program.

9. An electronic device according to claim 8, wherein said input power supply voltage is generated by a battery.

10       10. An electronic device comprising:

      a switching regulator for outputting a predefined output power supply voltage from an input power supply voltage; and

15       a semiconductor integrated circuit device including an internal circuit operated by feeding from said switching regulator,

      said switching regulator comprising:

      a driver control circuit formed in said semiconductor integrated circuit device;

20       an output circuit for generating an output pulse signal through a drive signal generated by said driver control circuit; and

      a smoothing circuit having an inductance and a capacitor for smoothing said output pulse signal and a  
25       diode provided between said output of said output

circuit and a ground potential of said circuit in order to prevent reverse current,

wherein said output circuit and said smoothing circuit are provided in the outside of said semiconductor integrated circuit device.

11. An electronic device according to claim 10, said output circuit comprising a switch MOSFET in which said drive signal is supplied to a gate and said input power supply voltage is supplied to a source.

12. An electronic device according to claim 11, further comprising:

a resistance for detecting current of said output circuit and a protective circuit for limiting an operation of said output circuit when a voltage generated in said resistance exceeds a predefined tolerance value.

13. An electronic device according to claim 10, wherein:

said internal circuit has a first operation mode consuming a first operational current and a second operation mode consuming a second operation current smaller than said first operational current; and

said switching regulator is arranged to have a current supply ability corresponding to said first operational current of said internal circuit,

said electronic device further comprising a  
step-down type regulator built-in said semiconductor  
integrated circuit device and having a current supply  
ability corresponding to said second operational  
5 current and a power supply control unit operating said  
switching regulator in response to a first control  
signal instructing said first operation mode in said  
internal circuit and operating said step-down type  
regulator in response to a second control signal  
10 instructing said second operation mode.

14. An electronic device according to claim 12,  
wherein said step-down type regulator is a series  
regulator.

15. An electronic device according to claim 12  
15 wherein said step-down type regulator is a switching  
regulator using a pulse output circuit for outputting  
pulses generated in a small output transistor  
corresponding in size to said second operational  
current generated in said semiconductor integrated  
20 circuit device and a switching regulator using said  
inductance and condenser.

16. An electronic device according to claim 10  
wherein said internal circuit comprising a data  
processing circuit having a microcomputer function for  
25 performing signal processing through a built-in

program; and

said first operation mode and second operation mode are switched and said first and second control signals are generated in accordance with said program.

5        17. An electronic device according to claim 16, wherein said input power supply voltage is generated by a battery.

18. A semiconductor integrated circuit, comprising:

10        a power supply terminal having a first operation mode and a second operation mode, to which electric power with a predetermined voltage is supplied;

15        a first power supply unit, connected to said power supply terminal for operating in said first operation mode and supplying source power which is a first voltage; and

20        a second power supply unit, connected to said power supply terminal for operating in said second operation mode and supplying source power which is a second voltage, wherein said first operation mode and second operation mode can be switched in accordance with an operation mode signal.

19. A semiconductor integrated circuit according to claim 18 further comprising a control circuit  
25        connected to said operation mode signal, wherein said



control circuit operates said first power supply unit when an instruction is given for said first operation mode and operates said second power supply unit when an instruction is given for said second operation mode.

20. A semiconductor integrated circuit according to claim 19, comprising:

a first circuit connected to said first power supply unit; and

a second circuit connected to said first power supply unit and second power supply unit.

21. A semiconductor integrated circuit according to claim 20 wherein said first operation mode is an operating state while said second operation mode is a state keeping state;

said second circuit performs a predetermined operation in said first operation mode; and

an internal state is maintained in said second operation mode.

22. A semiconductor integrated circuit according to claim 21, said semiconductor integrated circuit further comprising a third operation mode, wherein:

said control circuit operates said second power supply unit when an instruction is given for said third operation mode;

said second circuit has a third circuit and a fourth circuit, said third circuit being connected to said first power supply unit when an instruction is given for said second operation mode;

5        source supply is stopped when an instruction is given for said third operation mode; and

      said fourth circuit is connected to said first power supply portion when an instruction is given for said second operation mode and connected to said  
10    second power supply portion when an instruction is given for said third operation mode.

      23. A semiconductor integrated circuit according to claim 22 wherein, when said third circuit is instructed said third operation mode, power source is  
15    supplied to said third circuit from said first power supply unit for a predetermined period of time and then said source supply is stopped;

      when said third circuit is instructed said third operation mode, said third circuit passes  
20    predetermined information to said fourth circuit before said source supply is stopped.

      24. A semiconductor integrated circuit according to claim 19, further comprising:

      a fifth circuit connected to said first power  
25    supply unit; and

a sixth circuit connected to said second power supply unit.

25. An data processing system, comprising:

5 a power supply terminal having a first operation mode and a second operation mode;

a first power supply unit for supplying source power, which is a first voltage and a second power supply unit for supplying source power, which is a second voltage, both of which being connected to said power supply terminal;

10 an operation mode signal for instructing said first operation mode and second operation mode;

data processing unit;

15 a semiconductor integrated circuit having a supplied power selector unit for supplying source power from said first power supply unit to said data processing unit during said first operation mode in accordance with said operation mode signal and supplying source power from said second power supply unit during said second operation mode; and

20 a power supply unit connected to said power supply terminal and a first circuit connected to said power supply unit.